STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

July 12, 2007

Mr. Greg Cochran, Director
Michigan Dioxin Initiative
Michigan Operations
The Dow Chemical Company
1790 Building
Washington Street
Midland, Michigan 48674

Dear Mr. Cochran:

SUBJECT: 2007 *GeoMorph*™ Sampling and Analysis Plan, Upper Tittabawassee River and Middle Tittabawassee River, Midland, Michigan (2007 SAP), and the 2007 Quality Assurance Project Plan, *GeoMorph*™ Investigation Tittabawassee River (2007 QAPP), Midland, Michigan; The Dow Chemical Company, Michigan Operations (Dow); MID 000 724 724

The Michigan Department of Environmental Quality (MDEQ), Waste and Hazardous Materials Division (WHMD), has completed technical reviews of the 2007 SAP and 2007 QAPP prepared by Ann Arbor Technical Services, Inc. (ATS), on behalf of Dow. The 2007 SAP was posted to e-Project by Dow/ATS on July 2, 2007, and submitted in hard copy on July 9, 2007. The 2007 QAPP was posted to e-Project on July 6, 2007, and submitted in hard copy on July 11, 2007.

The 2007 SAP and 2007 QAPP are components of the revised Remedial Investigation Work Plan, Tittabawassee River and Upper Saginaw River and Floodplain Soils, Midland, Michigan (RIWP), that was submitted by Dow on December 1, 2006. The overall RIWP contains a number of "placeholders" and is under active review by the MDEQ. Dow is in the process of revising the RIWP to fill the "placeholder" issues and responding to technical comments that have been under active discussion between Dow and the MDEQ in an ongoing series of working meetings to address technical issues. Typically, the MDEQ and Dow have been meeting at least biweekly to discuss and, where possible, resolve technical and regulatory issues associated with Dow's submittals.

During the development of the 2007 SAP and 2007 QAPP, MDEQ staff met with Dow and its contractors in a number of all-day working meetings. The MDEQ has also provided guidance to Dow on several key issues associated with the 2007 SAP and 2007 QAPP in letters dated May 3, 2007, and June 22, 2007. Where resolution has not been reached during the technical working meetings or where the 2007 SAP does not adequately reflect agreements reached with the MDEQ or reflect direction given by the MDEQ in writing or during the technical working meetings, those issues are addressed by modification of the 2007 SAP as noted below. Given the need for rapid approval so that field activities can commence this month and the limited amount of time provided for regulatory review and

approval, the MDEQ continues to reserve its rights to further comment on, amend, or modify the 2007 SAP and 2007 QAPP and this approval, as necessary, during implementation of the 2007 SAP. In addition, the MDEQ reserves its rights concerning corrective action implementation under Dow's hazardous waste management facility operating license (Operating License), including Condition XI.S.

The MDEQ hereby approves the 2007 SAP and 2007 QAPP subject to the modifications and limitations identified below:

**Geophysical Surveys – Sub-Bottom Profiling**

The sub-bottom profiling components of the 2007 SAP are not approved at this time.

The 2007 SAP does not contain the information necessary to demonstrate that the sub-bottom profiling can be correlated with individual layers or deposits (e.g., sand, silts, or cellulosic deposits) in the Tittabawassee River sediments. In addition, the information provided in the 2007 SAP is not sufficient to allow the MDEQ to determine if the sub-bottom profiling will consistently and accurately identify the bottom of the unconsolidated sediments within the Tittabawassee River (i.e., top of lakebed clay and/or glacial clay till). It is noted that Dow had previously agreed (during meetings on April 12, 2007, May 24, 2007, and June 21, 2007) to provide the correlation data and graphics necessary to document the effectiveness and validate the use of the sub-bottom profiling technique described in the 2007 SAP for sediment investigation in the Tittabawassee River.

Response Required

The sub-bottom profiling is presented in the 2007 SAP as a critical component of the in-channel sediment characterization process. Therefore, **by August 3, 2007,** Dow will need to provide for review and approval by the MDEQ either (1) the required calibration data, figures, and analysis to document the effectiveness and validate the use of the sub-bottom profiling technique or (2) an alternate process to replace the sub-bottom profiling technique. Note that if Dow submits an alternate methodology, the text and relevant attachments of the 2007 SAP (e.g., Attachment H) will need to be revised to reflect this change.

**Priority 1 and Priority 2 Properties – Exposure Unit Characterization**

The 2007 SAP does not contain or reference a process or time line to develop the additional statistical information to validate the use of *GeoMorph*™ for reliably predicting exposure unit concentrations on Priority 1 and Priority 2 Properties. This core issue has been repeatedly identified by the MDEQ over the last year and was addressed most recently in my June 22, 2007, letter and our meeting on June 7, 2007.

Response Required

Consistent with the June 22, 2007, letter, Dow is required to provide **by August 3, 2007,** a supplement to the 2007 SAP that will provide a practicable, but statistically-based, exposure unit characterization at a number of Priority 1 and Priority 2 properties. This information will be used to validate and link the *GeoMorph*™ level of characterization to the exposure unit level of characterization required at other sites of environmental contamination in Michigan. As noted in my June 22, 2007 letter, the MDEQ anticipates this will be done using one or more of the strategies laid out in the MDEQ's Statistical Sampling Strategies Training Manual (S3TM). Also as previously discussed, we agree that it is important to initially

develop the *GeoMorph*™ level of characterization after which a subset of properties would be identified for statistically based sampling to be completed this field season.

In addition, it was noted during the review of the proposed sampling locations on Priority 1 and Priority 2 properties that in some cases it was not clear that the proposed sampling would bound the areas of contamination or determine concentrations of contaminants close to residential structures. Priority 1 and Priority 2 properties were identified by presence and proximity of floodwaters from the 2004 flooding event to dwellings and agricultural properties. Transects associated with these properties need to be extended as necessary to determine the concentrations of contaminants of concern in the proximity of the dwellings, to bound the area of contamination, and to identify representative properties for further exposure unit characterization.

**Frequency of Confirmation Analysis for 1613 – Tittabawassee River Project/Rapid Turn (TRP/RT) Results**

Section 3.2.7.1 of the 2007 SAP provides conditions, under which samples with estimated toxic equivalence (ETEQ) will be flagged for automatic confirmation analysis by Method 1613 B. These conditions do not address several concerns that were raised by the MDEQ during the discussion of this issue. In particular, a subset of samples of actively eroding soils and in-channel sediments was to have been proposed for confirmation by Method 1613 B with second column confirmation.

Modifications

Paragraph 5 on page 3-27 is modified, as follows:

> If the ETEQ concentration is greater than 50 ppt TEQ, and the 2,3,7,8,-TCDD contribution to ETEQ exceeds 10 percent, the 1613-TRP/RT results will be flagged for confirmation.

A new paragraph 7 is added, as follows:

> Confirmation sampling will also be conducted as follows:
> Twenty percent of randomly selected in-channel samples with an ETEQ concentration greater than 50 ppt TEQ will be flagged for confirmation.
> Twenty percent of randomly selected eroding bank samples with an ETEQ concentration greater than 50 ppt TEQ will be flagged for confirmation.

The MDEQ is willing to reevaluate the requirements of this modification based on the analysis of the initial results from the 2007 field season.

**Objectives and Deliverables**

Section 1.1 lists some of the deliverables from the implementation of the 2007 SAP. This section does not state that information will be provided on the potential constituents of interest other than dioxins and furans (secondary constituents of interest or SCOIs).

Modification

Section 1.1 is modified by the addition of the following bullet point to both the "UTR/MTR In-channel Sediment Characterization" paragraph and the "MTR Overbank and Floodplain Soil Characterization" paragraph:

- Graphical and tabular reports of the identified locations and depths of deposits and layers with elevated secondary constituents of interest (SCOIs) concentrations including the depiction of SCOI concentrations on maps and cross sections.

**Sediment Geochemistry**

Section 3.2.8 of the 2007 SAP discusses additional geochemistry work proposed for 2007. The language is this section does not specifically address the requirements or the schedule identified in the May 3, 2007, *GeoMorph*™ approval letter.

Modification

The following paragraph is appended to the end of Section 3.2.8:

> This work will include, but is not limited to, the determination of other contaminants of concern that may be associated with the graphitic carbon particles and different soil/sediment soil particle size fractions, determination of the density and other important physical characteristics of the graphitic carbon particles and organic carbon content, and additional work on the distribution of dioxins and furans in representative in-channel sediment samples. Part of this work, to be agreed upon with the MDEQ, will be scheduled for completion by the end of August 2007 so that the results can be utilized for the balance of the 2007 field work.

**Lower Tittabawassee River (LTR) Priority 1 and Priority 2 Sampling**

Section 3.2.11 lists a number of reaches in the LTR study area, shown in Appendix K, where the MDEQ has identified several high priority residential property areas for sampling during 2007. Consistent with the MDEQ's discussions with Dow on this issue, it was understood that it may be necessary to defer sampling in several lower priority areas of the middle Tittabawassee River (MTR) study area in order obtain data from these key residential areas in the LTR study area during 2007. The language in Section 3.2.11 indicates that the request to sample these properties will be accommodated to the extent possible within the resources and time available for the 2007 sampling season.

Response Required

Dow is required to sample the identified residential areas in Appendix K during 2007, in addition to the MTR work. Dow may propose, **by August 3, 2007,** for MDEQ review and approval, to defer sampling of some portions of the MTR, if necessary, in order to complete the required sampling in the LTR.

**Schedule**

Section 4.0 indicates that the 2007 SAP was submitted on June 15, 2007.

Clarification

This section is clarified to indicate that the 2007 SAP was submitted on July 2, 2007, and the 2007 QAPP was submitted on July 6, 2007.

**Schedule**

Section 4.0 does not provide a schedule for the submission of the final report from the implementation of the 2007 SAP.

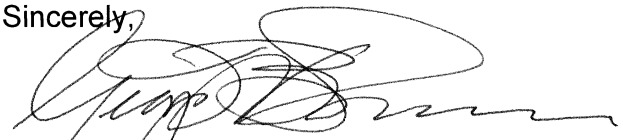
Modification
Section 4.0 is modified by the addition of a fifth bullet point, as follows:

- March 1, 2008 – Submit final report documenting the results of the implementation of the 2007 SAP

The approved 2007 SAP and 2007 QAPP are components of the December 1, 2006, RIWP and, as such, become enforceable in accordance with the conditions of Dow's Operating License. Failure to undertake the actions or responses required by this letter may result in the issuance of a Notice of Violation by the MDEQ.

Should you have questions regarding this approval, please contact Mr. Allan Taylor, Hazardous Waste Section (HWS), Waste and Hazardous Materials Division, at 517-335-4799 or by e-mail at taylorab@michigan.gov; or you may contact Ms. De Montgomery, Acting Chief, HWS, at 517-373-7973 or by e-mail at montgomd@michigan.gov; or you may contact me.

Sincerely,



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